

The Role of Soil Conservation in the Plant Production of Angola

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Introduction

The first scientists who studied soil erosion in Africa (FOURNIER, 1967; HUDSON, 1971) considered covering the soil with cultivated plants as the best preservation method. In Angola MARQUES (1976), a geomorphologist, was the first to call attention to the fact that soil erosion had a negative impact on agricultural production. Since the 1980s SZABÓ (1980) has been applying agro-technical methods in various regions of Angola. WHITLOW (1990) was the first scientist to consider the increase in the population, and the pressure of the population on the soil, as a direct anthropogenic effect. ELWEL & STOCKING (1984) did a considerable amount of work on the planning of soil conservation projects.

Material and Methods

The outflow measuring plots designed by SZOBOLJEV (In: SZABÓ, 1980) were applied for surveying erosion, together with the erosion pit network method. Geomorphological, phytogeographical, soil and geological maps (1:3,000,000) were available.

To analyze the experimental data the IDRISI programme was used (Fig. 1). The potential and mean erosion values were determined with the modified Wischmeyer-Smith model. The soil types of these spots were: Humic Nitosol, Rhodic Ferrosol, Xanthic Ferrosol, Red Ferralitic soil and Arthric Arenosol.

For the laboratory analysis the Hungarian and Portuguese standards were used.

Among the agrotechnical methods the effects of soil loosening were measured in the case of maize and coffee, and the effect of the contour lines was analyzed in the case of maize.

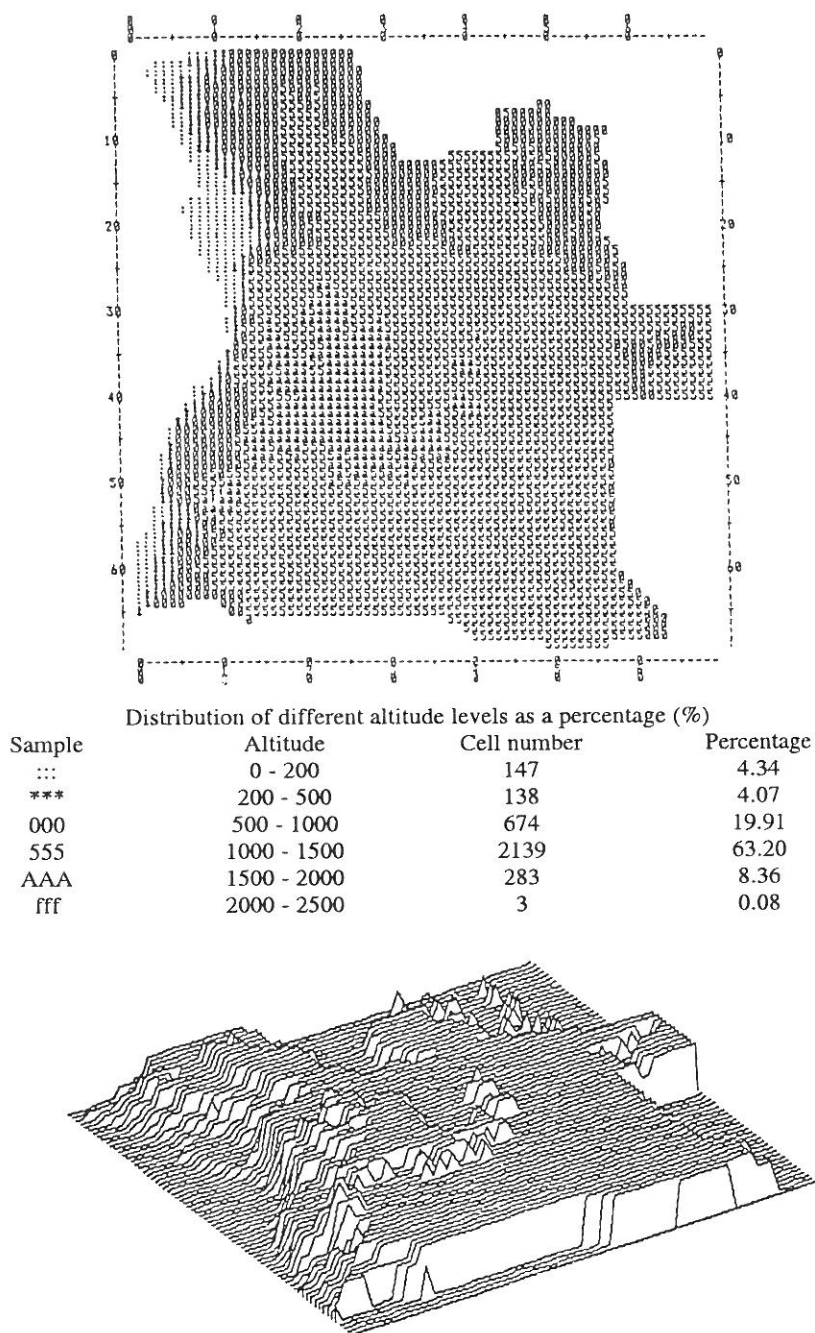


Fig. 1

Stereoscopic delineation of Angola's surface (on the basis of the IDRISI programme)

Results

The results obtained from the outflow-measuring plots proved that the 15 t/ha annual rate of erosion can be further reduced to 12 t/ha/year (ROOSE, 1980; SZABÓ, 1980). The yield of maize increased by 18-22% and the yield of coffee increased by 8-11% when using soil loosening. The exploitation of contour lines gives good results on inclinations smaller than 15-16%. From the experiments carried out in Angola the "C" and "P" values of the Wischmeyer-Smith model were determined.

According to the classification of annual average soil losses, 57.3% of the country has a permissible (0-10 t/ha/year) rate of erosion, while 35.5% is in a critical situation (10.1-30 t/ha/year) and 7.2% is in a dangerous situation (30.1 t/ha/year) from the point of view of erosion.

According to the potential erosion risk classification: 39.9% is in the 1st class, 32.1% in the 2nd, 17.9% in the 3rd, 9.1% in the 4th and 0.9% is in the 5th class.

In the case of pit emergence (based on the analysis of 150 pits) it can be stated that 3.3-4.7 ha of land is damaged for each hectare of pits (Fig. 2).

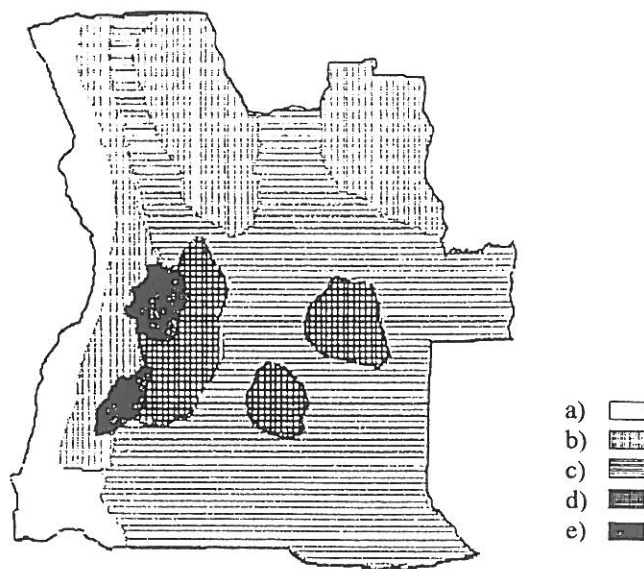


Fig. 2

Precipice-netting density of Angola (SZABÓ, 1980)

Legend: a) 0.01 - 0.1; b) 0.1 - 0.2; c) 0.2 - 0.4; d) 0.4 - 0.6; e) > 0.6 km/km²

Discussion and Conclusion

Angola is not too densely populated at present but the annual population increase is 2.27-3.31%. A considerable proportion of the arable land is located on inclined areas with a slope greater than 2-3%. As the population increases farmers will make more frequent use of sloping areas and this will result in stronger erosion. These facts emphasize the importance of introducing agrotechnical methods to reduce erosion. Parallel with the introduction of the essential agrotechnical and biological methods, it is necessary to organize short courses on soil conservation at the elementary and intermediate level.

Summary

The results of the experiments indicated the need to introduce soil protection. By organizing soil protecting projects and using adequate agrotechnical methods in the production of food and export plants, one of the most important parts of the national heritage: the soil can be conserved.

References

- ELWEL, H. A. & STOCKING, M. A., 1984. Estimating soil lifespan for conservation planning. *Tropical Agriculture*. **61**. (2) 148-150.
- FOURNIER, F., 1967. Research on soil and conservation in Africa. *African Soils*. **12**. 53-96.
- HUDSON, N., 1971. *Soil Conservation*. 1st ed. Cornell University Press. New York.
- MARQUES, M., 1976. Notas sobre la geomorfologia de Angola. *Ser. Geol.* 1/4. 99-106.
- ROOSE, E., 1980. Dynamique actuelle d'un sol ferrallitique gravillonnaise issu de granite sous culture et sous savana arbustive soudanienne du nord de la Cote d'Ivoire. *ORSTOM. Ser. Pedol.* **XVII**. (2) 81-118.
- SZABÓ, L., 1980. Erosao eo seu controlo. Humabo, Apontamento.
- WHITLOW, R., 1990. Potential versus actual erosion in Zimbabwe. *SPLASH*. **6**. (3/4) 8-25.